**Link:** https://ieeexplore.ieee.org/abstract/document/9511329

**Model Used:** An Adaptive Defogging Intensity Parameter Model

**Method Used:** 2D Otsu remote sensing methods, Mixed Dark Channel Algorithm, and deep learning-based methods.

**Summary:**

*Two-Dimensional Otsu Remote Sensing Image Segmentation Algorithm:*

This algorithm is popularly used for automatic thresholding which is used to separate the foreground and the background region of an image. Its aim is to find an optimal threshold value that maximizes the between class variance. Before proceeding we would need to enhance the quality and reduce noise in the image were necessary. Applying the algorithm to segment the image into multiple regions. After which we use this segmented map to identify the region which is mostly affected by the fog. This region would typically have lower contrast and higher fog density as compared to the clear regions. Once the region has been identified multiple techniques may be used to make the image more visible. These techniques include transmission estimate atmospheric light estimate or image restoration methods (Fusion based methods or learning based methods).

*Mixed Dark Channel Algorithm:*

I dark = αIdarkf + βIdarkb

the foggy image is first segmented using the two-dimensional Otsu algorithm. This algorithm takes the intensity value and this special relationship between the pixel to the identifier region with the different fog density. The distant area commonly has more fog than the nearby area. The initial dark channel (Idark) is computed by selecting the minimum value in the RGB foggy image. The duck areas represent the lowest intensity value corresponding to the region affected by the fog. The dark channels in the nearer area (Idarkf) and the dark channels in the distant area (Idarkb) are obtained based on the segmentation results representing the dark region where the fog density differs. The values of alpha(α) and beta(β) are the adjusting parameters in the range zero to 1 and there's some equals one. The algorithm I reached to different values for alpha and beta until it finds the optimum value after checking the defogging effectiveness.

*An Adaptive Defogging Intensity Parameter Model:*

This model aims to improve the defogging effect by dynamically adjusting the fogging investigative parameter denoted by ω. It also estimates the atmospheric light value obtained through the dark channel prior. The goal is to find the optimal ω that provides the best restoration for foggy images.

Based on the experimental results from the research it was noted that the optimal ω value varies for different images however the relationship between ω and atmospheric light(A0) was identified as the closer the value of ω to A0 the better the defogging effect.

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Description automatically generated

In this equation, A0 is the estimated atmospheric light value, and t(x) represents the transmission map for each pixel x. The division factor considers the minimum ratio of each color channel Ic(y)/Ac(x) within the local patch Ω(x), and the overall transmission is computed as 1 minus the minimum ratio.

